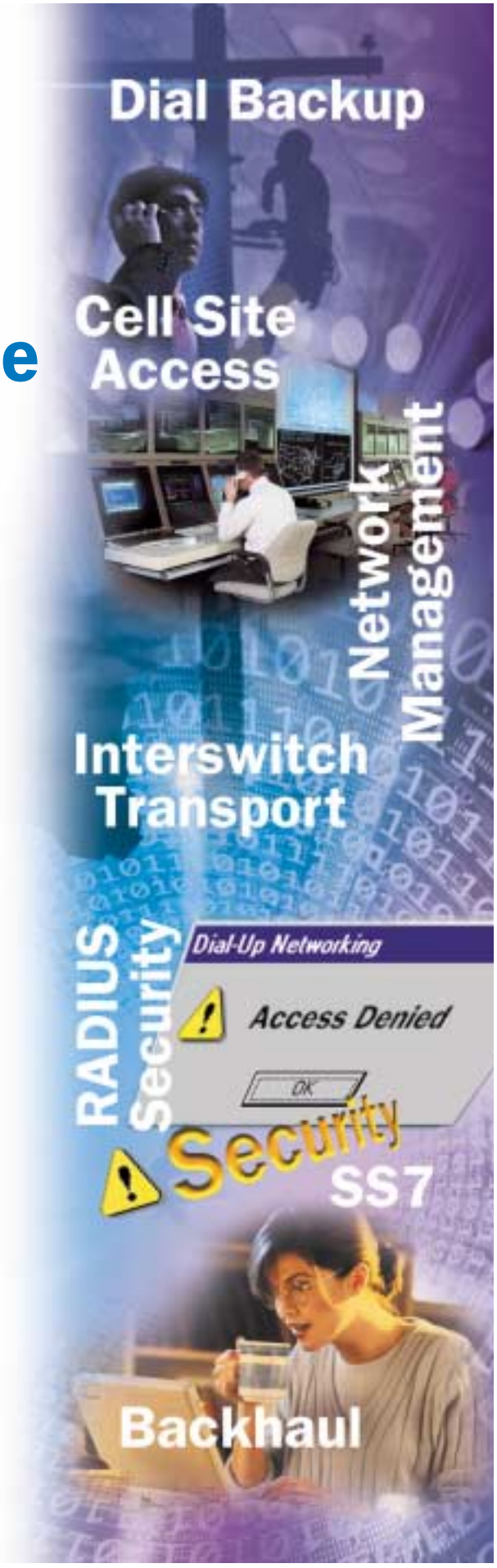
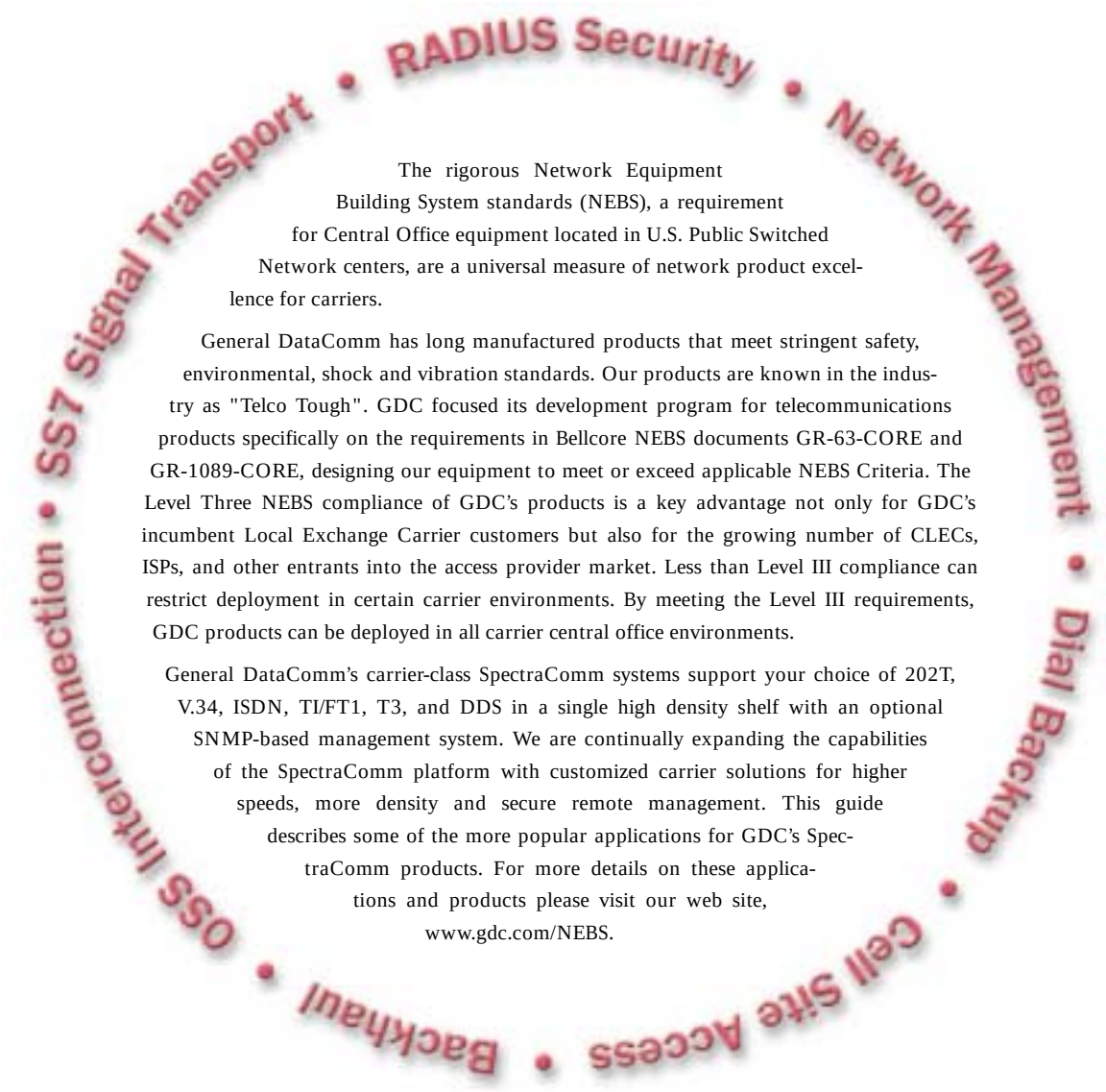
NEBS-Compliant Product Solutions For Carriers and Service Providers



Certified NEBS III Compliant

General DataComm



The rigorous Network Equipment Building System standards (NEBS), a requirement for Central Office equipment located in U.S. Public Switched Network centers, are a universal measure of network product excellence for carriers.

General DataComm has long manufactured products that meet stringent safety, environmental, shock and vibration standards. Our products are known in the industry as "Telco Tough". GDC focused its development program for telecommunications products specifically on the requirements in Bellcore NEBS documents GR-63-CORE and GR-1089-CORE, designing our equipment to meet or exceed applicable NEBS Criteria. The Level Three NEBS compliance of GDC's products is a key advantage not only for GDC's incumbent Local Exchange Carrier customers but also for the growing number of CLECs, ISPs, and other entrants into the access provider market. Less than Level III compliance can restrict deployment in certain carrier environments. By meeting the Level III requirements, GDC products can be deployed in all carrier central office environments.

General DataComm's carrier-class SpectraComm systems support your choice of 202T, V.34, ISDN, TI/FT1, T3, and DDS in a single high density shelf with an optional SNMP-based management system. We are continually expanding the capabilities of the SpectraComm platform with customized carrier solutions for higher speeds, more density and secure remote management. This guide describes some of the more popular applications for GDC's SpectraComm products. For more details on these applications and products please visit our web site, www.gdc.com/NEBS.

Remote Out of Band Management Solutions

Line-by-Line Dial-In Solutions

Dial-In Management Access for Up to Four Devices

Figure 1 shows the simplest form of remote network management. Two GDC SpectraComm (SC) Dual V.34 modem cards enable direct supervisory access to up to four devices via the serial port. One SC 2000 — occupying one rack unit of space at the POP — is all that is needed to support dial-up management access to up to four DSLAMs and/or voice switches. When a remote dial-up connection is made to a modem, administrators at the Network Operations Center (NOC) have direct access to the DSLAM for remote control, monitoring and diagnostics.

In this scenario, all of the management connections are direct-dialed between the NOC and the serial port on the DSLAMs, which eliminates the possibility that the hub or router will fail and not allow access. Certain key configuration parameters are only available through the serial port, setting the IP address, for example.

GDC's Solution

Combining GDC's rackmounted modems and the compact SC 2000 enclosure provides a cost-effective dial-in solution for up to four network elements in a small, NEBS Level III compliant unit.

LAN Connected Out-of-Band Management

In Figure 2, the SpectraComm 2000 shelf is configured with one V.34 modem and one SpectraComm Manager (SCM) card. The SCM provides a management interface to the Ethernet LAN, enabling remote management of all the devices through the network.

A single call from the NOC to the remote POP provides access to the manageable devices in the collocation space. This link puts the network operator directly in contact with the Ethernet LAN, enabling them to access and manage multiple devices via one IP connection. By utilizing a common Ethernet hub, this configuration uses less equipment overall and requires fewer dial-in lines.

GDC's Solution

The unique SpectraComm solution gives network operators access to multiple devices with only a single dial-in link. GDC is the only manufacturer who can package a V.34 class modem with three levels of password security in the modem, RADIUS Security, and the SCM LAN interface card in a very small NEBS Level III compliant shelf, meeting all the requirements for collocation in service provider's CO.

LAN and Legacy

For optimal management access, both primary LAN and secondary dial-in connections can easily be configured. In Figure 3, the network is set up to allow LAN-connected access during normal network operation, with fail-safe dial-in connections for disaster recovery.

Diverse Dial Paths

Figure 3 also shows a configuration that allows diverse dial paths, enabling network operators to dial-in via alternate paths if the initial POTS line goes down.

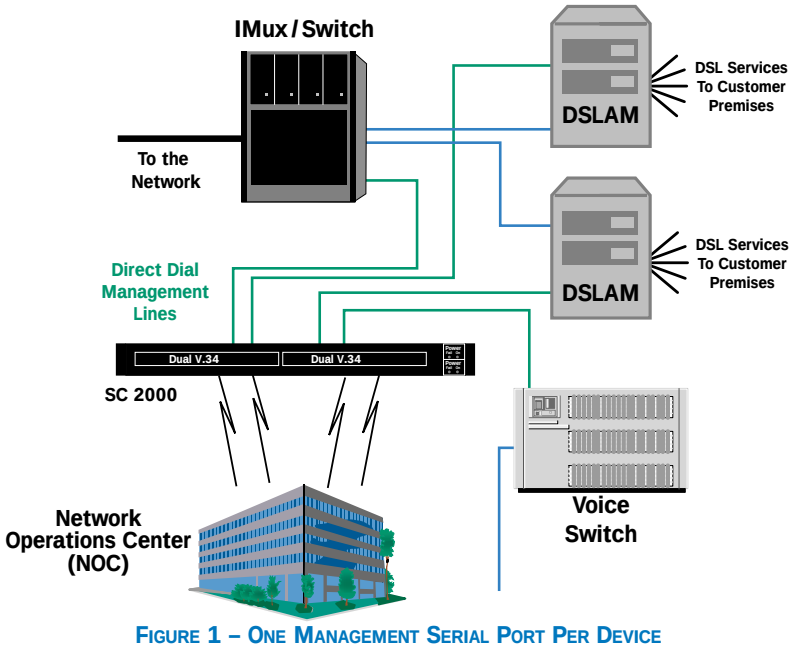


FIGURE 1 – ONE MANAGEMENT SERIAL PORT PER DEVICE

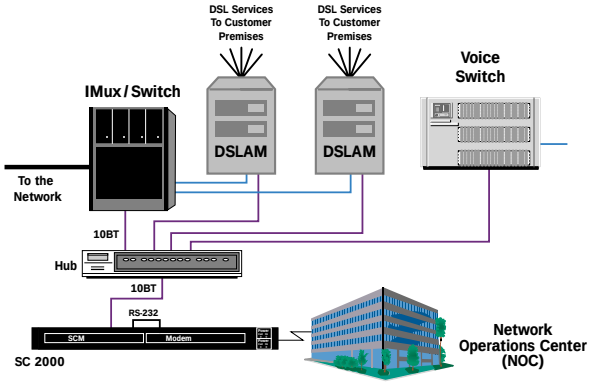


FIGURE 2 — ONE PORT REACHES ALL DEVICES

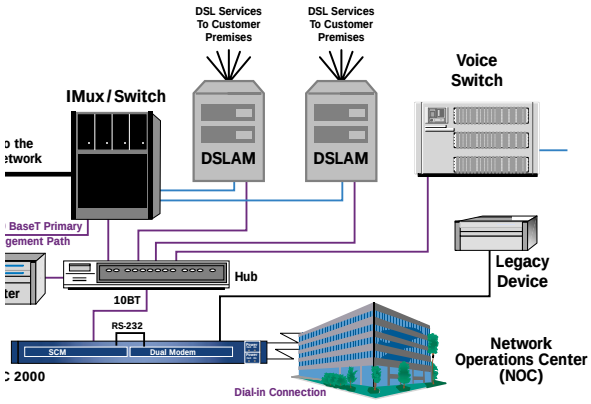


FIGURE 3 — LAN AND LEGACY

T1 Backhaul

T1 Backhaul extends the T1 circuit to users located a great distance from the POP. Rural users, as well as those located in low-density locations, are usually located near smaller Central Offices and POPs that do not have their own DSLAM. Therefore, the data traffic is routed to a DSLAM via T1 connections. As the area becomes more densely populated with users, more T1 connections are added, eventually moving to a T3 connection.

GDC's T1 Backhaul solution can be deployed in conjunction with the Remote Management Solution by expanding to the SpectraComm high density shelf and adding the appropriate data sets (Figure 4). This provides a cost-effective transport solution in a NEBS, Level III-compliant shelf, while delivering SNMP Management and line statistics.

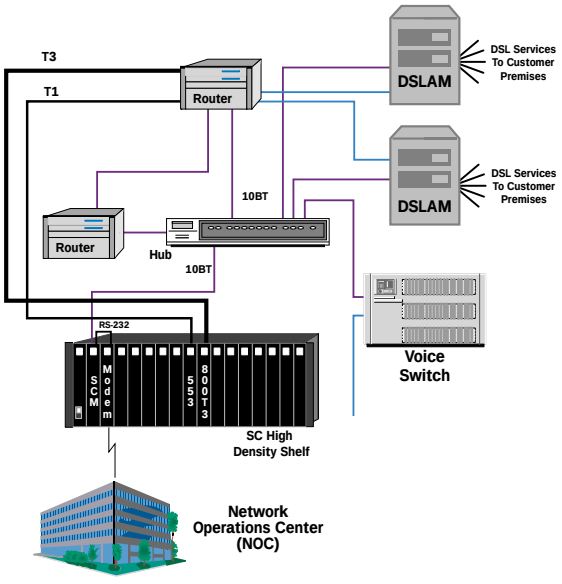


FIGURE 4 — BACKHAUL OPTION

RADIUS Security For Legacy Applications

To answer many of the Internet's security needs, a new standard of authentication was developed. Remote Authentication Dial In User Service (RADIUS) brought a client-server architecture to ISPs, enabling efficient, secure authentication of dial-in users. RADIUS manages a database of users, provides authentication so that the dial-in user is allowed access, and delivers configuration information detailing the type of service to deliver to the user — such as SLIP, PPP, telnet, etc.

Just as RADIUS answered the needs of ISPs for security, network managers can use dial-in serial connections for remote management, providing contact with every device in the network. This provides the perfect way to authenticate users of legacy equipment and applications.

Key Features of RADIUS include:

- Client/Server Model

  A Network Access Server (NAS) — operating as a client of RADIUS — passes user information to designated servers and acts upon the response. RADIUS servers receive connection requests, authenticate the users and return the appropriate configuration information.

- Network Security

  Authentication occurs through a "secret" that the RADIUS client and server share, but is never sent over the network. User passwords are encrypted, eliminating the possibility that hackers can determine any passwords.

- Flexible Authentication Mechanisms for Legacy Applications

  GDC's RADIUS for legacy applications supports ASCII Async formats used by Terminal Emulation Programs

- RADIUS Servers are Industry Standard

  Easy to maintain and manage database of passwords stored in RADIUS Server allows for passwords to be managed from RADIUS instead of individual modems.

GDC's RADIUS Solution

GDC's SpectraComm Manager (SCM), Dual V.34 and single SpectraComm V.34 modems' management support RADIUS Security. The V.34 modems prompt the user for name and password and forward this information to the RADIUS server. The RADIUS server authenticates the user and returns a message to the modem to grant or deny access. Optionally, the RADIUS server may challenge the remote user and request additional information before granting access.

GDC's modems offer additional protection from "hackers" via GDC's patented SteadFast Security®. This exclusive system delivers multiple levels of security, providing additional or fail-safe protection if the RADIUS server is out of service.

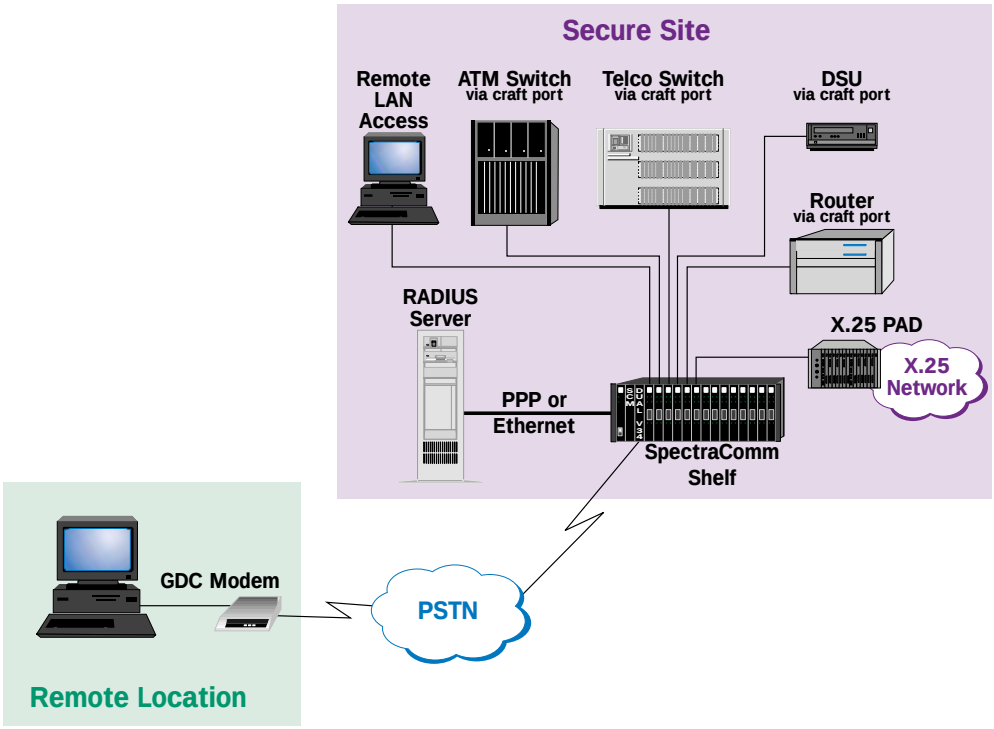


Figure 5 — GDC Adds RADIUS Security to Legacy Applications

SS7 Interswitch Signaling Transport

Over the years, providers have sought a more efficient, highly reliable solution to provide interswitch transport. GDC's solutions provide NEBS Level III compliant, ultra reliable, high density, managed interaccess provisioning vehicles.

Initially, carriers deployed a channel bank to split the incoming T1 link.

Now, LECs and carriers provision the bandwidth via T1 circuits, using one 56/64 kbps timeslot for the signaling channel. Some smaller CLECs and other independents use 56/64 kbps DDS circuits for cost-saving reasons (Figure 6).

GDC's SpectraComm 5000 Series provides integrated T1/FT1 CSU/DSUs that eliminate the need for a channel bank. The SC 5001 serves as a channel bank for collocated SC 5520 DSU cards, which handle one DS0 each (Figure 7, Option A). The SC 5001/5520 architecture permits multiple SS7 links to share a common T1 facility. Alternatively, when optimum network redundancy is required, the SC 553 may be used (Figure 7, Option B).

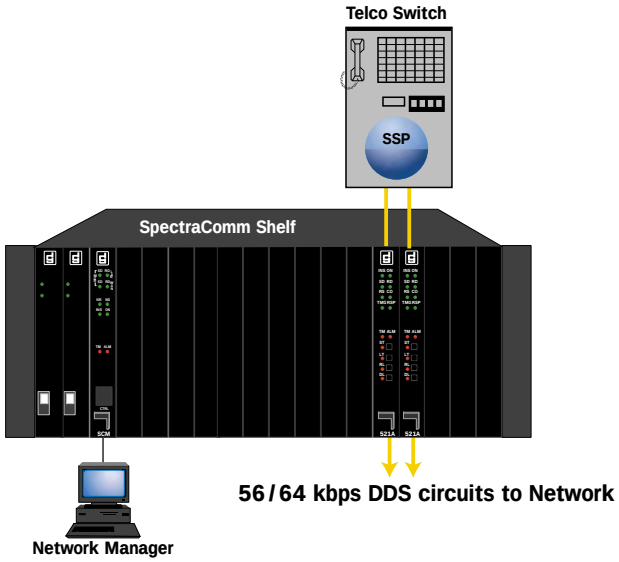


Figure 6 — Line-by-Line 56/64K Circuit

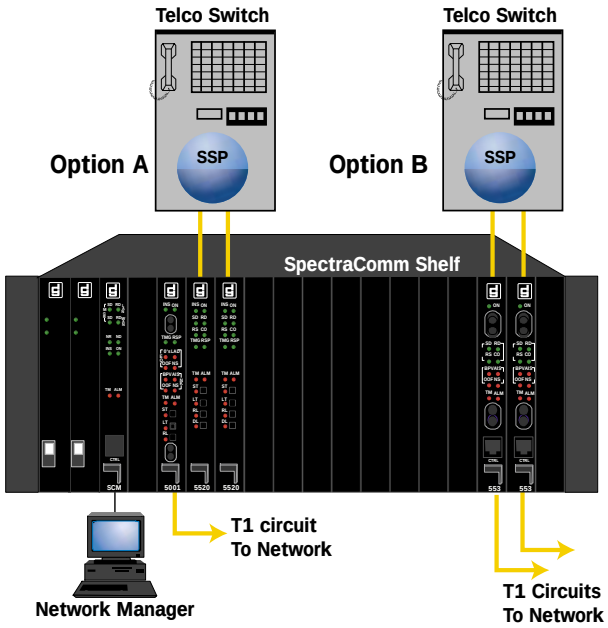


Figure 7 — GDC's Integrated and Line-by-Line T1 Solutions

Cellular Service Access Package

The Cellular Service Access Package (CSAP) is a cell site unit that supports T1 communication between cellular phone service cell sites (or base stations) and associated switching stations. The CSAP comprises GDC's SpectraComm 2000 two slot enclosure and up to two SpectraComm 553 (SC 553) T1 DSU/CSUs. The CSAP resides in high density cell site cabinets, forming the bridge for wireless cellular phone service to basic land line services. The SC 553 T1 DSU/CSUs can be equipped with an optional cascade port (DSX-1 interface) to link contiguous cell sites as a cost savings measure using fractional T1 service (FT1) or to function as a CSU where specific CSU application support is required. Rapid installation and remote management enable network managers to control costs.

GDC's high density SpectraComm 5000 provides a complementary switching station offering. The SpectraComm shelf is a compact (7" high), NEBS-compliant, networked managed chassis incorporating an intelligent backplane architecture. The SpectraComm shelf is ideal for use at cellular switching stations where higher T1 DSU/CSU density is required. The shelf has 16 slots to house a series of data transmission and management cards, such as the SC 553 and the SpectraComm Manager (SCM). The management, alarms, control, and data bus can be extended to a second shelf. The shelf's compact size saves space at critical locations, as well as power, since it is designed to limit power to 6 watts per slot. A redundant power option is available, as are redundant SCMs for fault-tolerant applications.

GDC's SNMP-based TEAM network management application is an effective tool for the difficult job of overseeing large cellular networks. From switching stations to cell sites, end-to-end control of the cellular network through proactive SNMP management is probably the singular most important advantage of the GDC solution. GDC's TEAM 553 application software supports this SNMP management function by presenting potential problems in a user friendly way, providing the troubleshooting tools to isolate and act upon problems quickly. Other management alternatives include Telnet, MIB browsers or rudimentary VT100 terminals with direct connection to the craft port of the SCM or SpectraComm 2000 enclosures.

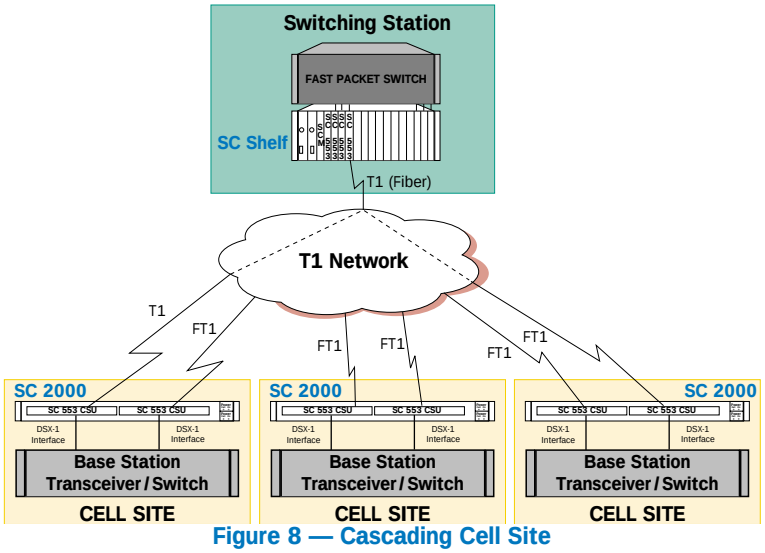


Figure 8 — Cascading Cell Site

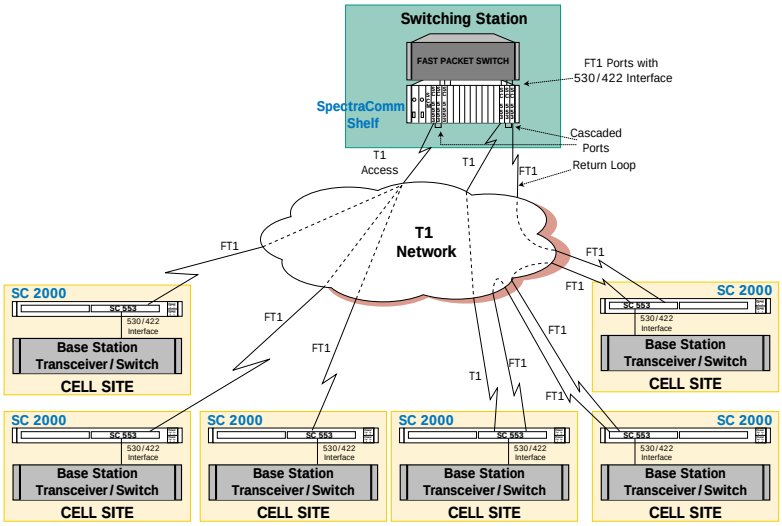


Figure 9 — T1 Access and Cascading Cell Site

Dial Restoral and Disaster Recovery

Today's data communications networks are complex, increasingly important corporate assets. As such, network administrators strive to reduce or eliminate network downtime. GDC's dial restoral and disaster recovery products play chief roles in maintaining network uptime.

In addition, carriers may want to create an **Operations Systems Support (OSS) network connection to other carriers**. This connection would allow the carrier to verify calling card numbers, validate interconnect agreements for particular subscribers, and for general wholesale use of the carrier's database.

Overview

The SpectraComm 28.8 / V.34 dial back up modem provides dial back up for the SC 521A, SC 500A DDS DSUs or SC 202 private line modems.

Applications

Point-to-point dial backup is shown in Figure 10. The dial backup procedures for both analog and digital connections are very similar. A computer or FEP is connected to a user terminal via a leased line. To establish a backup connection, the central site modem calls the remote user's terminal modem to establish a dial line. The dial backup procedure is handled entirely by the modems, or can be manually activated, in which case the dial backup link is established with assistance of a technician.

In applications involving two-wire operation, a single telephone call is all that's required. The new communication path operates in full duplex mode — data can be transmitted and received simultaneously. In four wire dial backup procedures, two telephone calls are placed on the two dial-up telephone lines — one for transmitting and one for receiving.

Multipoint dial backup involves special considerations not found in point-to-point environments (Figure 11). First, multidrop circuits are a bit more complicated, since several modems and conversations are operating on the same circuit. The network operator must determine the number of lines required to back up a multipoint network. When a line failure occurs at one remote site, the customer would prefer to reroute only that site, while keeping the other remote site circuits on the leased line. GDC's solution does just that by dialing the failed remote site only, and bridging that connection back to the master modem.

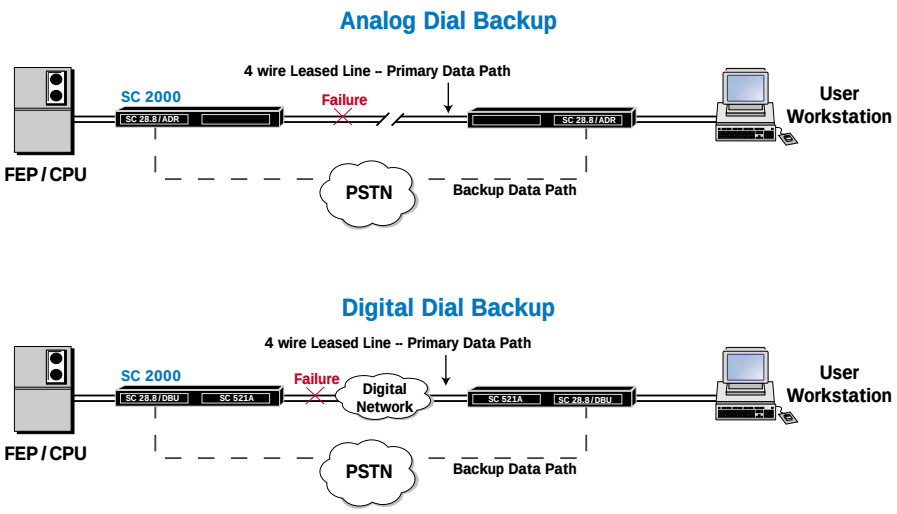


Figure 10 — Point-to-Point Dial Backup

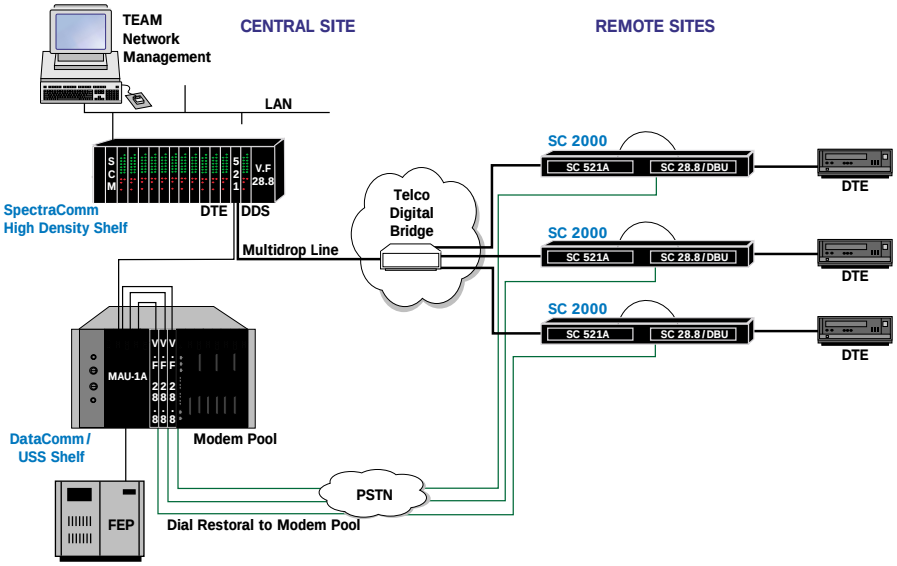


Figure 11 — Multidrop Automatic Restoral

For more information on the applications and products in this brochure, please visit our web site, www.gdc.com/NEBS.

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